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SOCIAL PERSUASIVE EDUCATION CLOUD MODEL – A CASE STUDY

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Abstract

The cloud based smart classroom helps in teaching, learning and assessment methods. This paper proposes taxonomy of each education system processes namely teaching, learning, assessment and school management prevalent presently with underlying communication process based on social support and persuasive theories. Learning and Teaching Expo of Hong Kong during December 2014 helped to test the propositions that education cloud provides social support (P1), persuasive support (P2) and social persuasive support (P3) and to come up with the taxonomy of education cloud and processes involved. This case study was done by visiting the expo, seeing demonstrations, interviewing the educational product providers and analyzing secondary data provided by them through pamphlets and websites. The designed taxonomy will help all stakeholders of educational institutions to classify the education cloud environment. The stakeholders could consider the features that meet their needs and implement the educational processes efficiently.

Keywords: Education cloud, social support, persuasiveness, social persuasive education cloud, taxonomy, education processes

1 INTRODUCTION

In a traditional classroom, students learn through face-to-face interaction with instructor. Social support theory is one that states the close inter-relationships with humans (between teachers and students). When social support was traditionally conceived as taking place in close personal relationships via face-to-face interaction, presently it changed to the norm as social support exchanged in numerous virtual communities through computer-mediated communication across the Internet and other electronic networks (Walther, 2002). With such immense computer resources at our disposal in digital forms anytime, anywhere, there are lot of opportunities for teachers to persuade students to explore in many ways. Studies like theory of persuasiveness (Fogg, 2003) posit that it could be done through seven steps such as reduction, tunneling, tailoring, suggestion, self-monitoring, surveillance and conditioning.

The main focus of this study is to propose a Social Persuasive Education Cloud model that considers these factors relating to social support and persuasiveness. The motivation for this study is attributed to the existence of Education Cloud that provides access to variety of education services, through whatever device or devices they have access to (laptops, desktops, PDAs, etc.) (CISCO, 2015) by set of users (including teachers, students, parents and others).

The broad degree of configurability of any cloud-based services and resources gives teachers and students new opportunities to create rich environments for teaching and learning (González-Martínez et al, 2015). Educational institutions cashing in on technology changes have automated their teaching and learning processes (Leidner & Jarvenpaa 1995). But effects of cloud on the education area has not attracted the researchers much. So to fill that gap, we raise the research question: will the education cloud provide social support and persuade the student learning? The answer is explored based on the theories of social support and persuasiveness, and a smart classroom offering social persuasive computer mediated instruction to support all the education processes like teaching, learning, assessment (Leidner & Jarvenpaa 1995) and school management. Also taxonomy of social persuasive education cloud was proposed considering various educational processes in the context of education cloud providers to empower the stakeholders for efficient cloud adoption.

This paper starts with the presentation of literature review and research context on social support and persuasiveness of education cloud. Then follows with the methodology used in classifying the education processes based on a case study and taxonomy of such a cloud and ends with a conclusion.

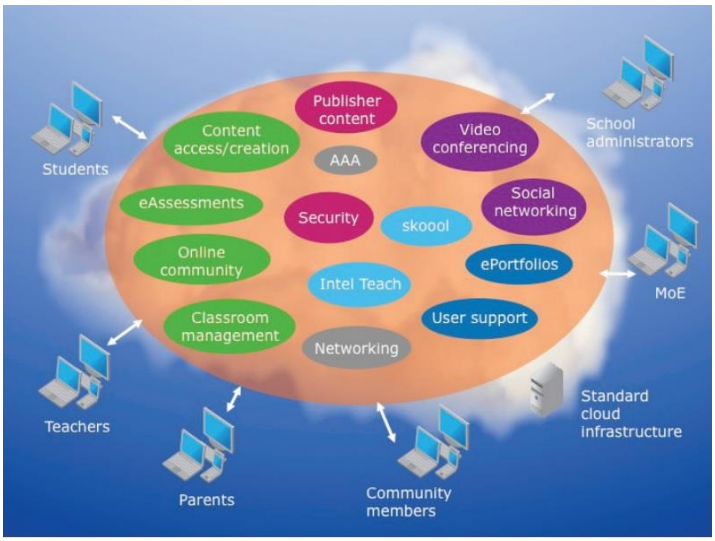
2 LITERATURE REVIEW AND RESEARCH CONTEXT

House (1981) defines social support as four types of acts such as information, instrumental, appraisal and emotional support. It is undeniable that all these types of support exist in any classroom where teachers and students interact with each other. Teachers use many different resources to teach concepts giving information support to manage the learning activity. Instrumental support also exists in classrooms where teachers help students to learn. Feedback during the class session fulfils the appraisal. Electronic peer-to-peer communication encourages all members of the class to contribute to class discussion (Bump 1990) thereby students supporting or rebutting each other's comments socially. Emotional support is given through communication networks formed by the students among themselves, teacher to students and teacher to parents.

Persuasiveness is typically defined as "*human communication that is designed to influence others by modifying their beliefs, values, or attitudes*" (Simons 1976). Persuasion is not accidental, nor coercive. It is inherently communicational (Dainton 2010). Technology based definition would be any interactive product designed to change attitudes or behaviors by making desired outcomes easier to achieve is

Persuasive technology (Fogg 2003). The smart classroom of today has gradually evolved and is slowly embracing this persuasive technology in which teaching and learning styles are getting changed.

Research on the education cloud in Information Systems is still nascent. To give an idea of the components of a typical education cloud, we present the one offered by Intel (cloud provider) pictorially represented as in Figure 1 (Fogel 2010).



K-12 Education cloud consists of various applications that include the basic education processes such as teaching, learning, assessment and school management. The stakeholders were students, teachers, parents, school administrators, community members etc. It points out the applications that are available for educational purposes like classroom management, e-assessments, e-portfolios, content access/creation, networking, publisher content, video conferencing. Online community, user support, social networking and other applications like skoool and Intel Teach also come under Intel education cloud.

Figure 1. Example - Intel K-12 Education cloud - user's perspective

To achieve the research objective, we discuss about the advanced technologies such as smart classroom and cloud services that helps in changing the teaching and learning styles based on the theories of social support and persuasiveness in this paper.

During the visit to the Learning and Teaching Expo (LTE 2015), most of the exhibitors were propagating the socialized school environment through E-learning and cloud implementation and communication networks set between teachers, students, parents and school management. Some demonstrated the way the teachers and students are engaged using computer mediated instruction, and students getting persuaded to learn for better learning outcomes. This motivated the study of fitting education cloud to social persuasive model.

Based on prior studies we can categorize the education processes to be teaching, learning and assessment (Leidner & Jarvenpaa 1995). We propose an underlying education cloud process namely communication process which fits into the area of inter personal relationships. All the stakeholders are able to communicate with each other through various types of electronic media starting from computer (Leidner & Jarvenpaa 1995) to the smart devices through Intranet with easy and free to use applications available on the cloud such as yahoo mail, google gmail, hotmail and many other instant messengers. The main ingredient for smart class is this communication process.

Social support comprises of information, instructional, appraisal and emotional support (House 1981). Superficially everyone could agree that all these support elements can be provided by the educational cloud which is mainly linked with various communication facilities between teacher, student, management and parents. To explore whether all these supports are provided by the educational cloud we formulate the proposition **P1: Education cloud facilitates social support in smart classrooms.**

But will social support alone can build the relationship thereby improving the teaching and learning methods in imparting the knowledge to the students? Then comes persuasiveness which plays a major role in all the education processes.

The objectivist model assumes the goal of teaching as to facilitate the transfer of knowledge from the expert to the learner. Errors in understanding are the result of imperfect or incomplete knowledge transfer. Leidner and Jarvenpaa also state that the pace of instruction must be designed modularly with students' progress on one topic area before proceeding to the next one (1995). If they are not able to understand, then teacher has to use alternate methods to do the same again. At this point, the theory of persuasion will help in modifying the teaching and learning method in such a way that process becomes easier and effective. For example, students can be engaged by teacher's persuasion.

Fogg claims that commonly used seven strategies for teaching are reduction, tunneling, tailoring, suggestion, self-monitoring, surveillance and conditioning (Andrew, Borriello & Fogarty 2007). If the student's understanding of a particular topic is not as expected, the teacher can use the *reduction* method by breaking the complex task into simple tasks. Also teachers can guide the students by tunneling, tailoring, suggesting, self-monitoring, surveying and conditioning of various degrees to engage the students and improve their understanding. Study will be done to know how this is facilitated in education cloud. These arguments leads to the proposition **P2: Education cloud facilitates persuasive support in smart classrooms.**

How is this persuasive teaching and learning supported? It can be achieved only through the social support. When persuasive strategies are in force, the social support also comes into picture. Based on the response statistics for a particular topic presented through the instant communication between students and teacher in a class, students are able to know where they stand compared to all others in the class. These communication facilities and cloud resources are not available in all the educational institutions as of now. So, based on the available resources in a classroom, we classify them as follows.

Non-social non-persuasive classrooms (which are still prevailing in under-developed countries) have direct face to face interaction between the teacher and the students. One-to-one attention will be minimal. So, with no technological elements involved, the classroom can only have social and persuasive classroom activities to limited extent. *Persuasive Classroom* is one with just a computer (Laptop or desktop) and projector without Internet facility where the teacher gets opportunity to use various ways to explain the content to the students using documents, spreadsheets and on-screen visual (audio and video) presentations. This has high persuasiveness in making the student engage in learning with different computer mediated instructions but social support is limited. *Social Classroom* is one with computer and internet facilities added to it by which teacher has a vast knowledge bank to get more details for the content (text, audio and video) and present them to the class whenever required. Social support can be extended by email communications between teacher, students and parents making it high. But technological persuasiveness is limited as the teacher can implement the seven strategies pointed by Fogg only to a certain extent. *Smart classroom* is one where internet facilities with computer and smart devices are available for both teachers and students. Teacher communicates with students through devices along with the face-to-face interactions. This is feasible only due to cloud implementation as most of the content, assessment and feedback are all taken care by the applications that run on the cloud. The teacher can teach the class a topic first and assign some work through the devices and get the formative and summative feedback instantly to know whether what is taught is assimilated by the students. Teacher can engage the class by persuading them to learn in a better way. So it is an example for social persuasive classroom.

Figure 2 gives an overall view of these arguments considering different types of classrooms. This argument leads to the proposition **P3: Education cloud facilitates social persuasive support to education processes.**

So to find evidence for these propositions, this research tries to fit this smart classroom into the education cloud model similar to one presented in Figure 1, by looking into the traditional classrooms which are still prevailing in many countries and smart classrooms of the present.

The traditional competitive assessment strategies may disable learning (Leidner & Jarvenpaa 1995) as they are formative in nature. But with present computer mediated instruction, if the assessment feedback is as expected or negative, then the teacher can customize the teaching materials easily to make the content understandable and more interactive with the available cloud resources. The four strategies reduction, tunneling, tailoring and conditioning of persuasive theory and information and instrumental support of social support theory are considered as one as all of them involve some kind of customization of the contents and style to teach efficiently. Suggestion component of persuasive theory will be more effective in the appraisal support. After reducing the components as discussed, we propose the measurement items as depicted in Figure 3 pictorially and show how the present day education cloud is based on theories of social support and persuasiveness.

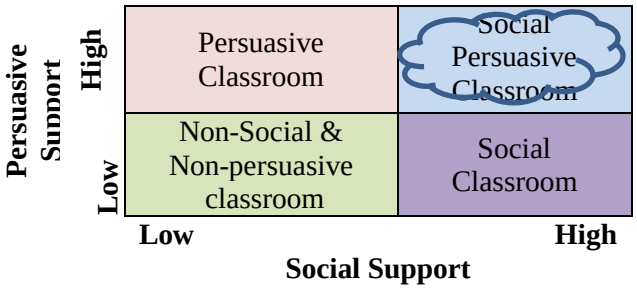


Figure.2. A Model of Social Persuasive Education Cloud

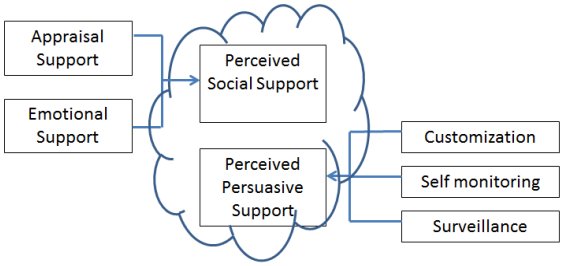


Figure 3. Measurement Items of Social Persuasive Education Cloud

Based on the above principle and the applications provided by the cloud, the four education processes of teaching, learning, assessment and school management can be further **boolean** mapped to each measurement item of the theories of social support and persuasiveness as in Table 1 to represent the technology fit of education processes. As we expect the education cloud to be social persuasive, all the items in Table 1 are Boolean marked. But based on the applications provided by the vendor, it has to be checked for the type of support given.

Theory	Measurement Items	Education Processes			
		Teaching (Teacher)	Learning (Student)	Assessment (Teacher & Student)	School Management (Administrator)
Theory of Social Support	Appraisal support	√	√	√	√
	Emotional Support	√	√	√	√
Theory of Persuasiveness	Customization	√	√	√	√
	Self-monitoring	√	√	√	√
	Surveillance	√	√	√	√

Table 1 - Technology fit of education processes with theories

3 METHODOLOGY

Case study method was used to find the supporting details for the theories. A quantitative study is also planned to get input from both the vendors and the teachers regarding the education cloud applications especially in Special Education Needs schools in Hong Kong where it is used widely now. Education Bureau of Hong Kong Government organized the Learning and Teaching Expo with various sponsoring bodies from December 11-13, 2014 in Hong Kong Convention and Exhibition center which had 200 exhibitors from Hong Kong, China, Taipei, Singapore, US, UK, Finland, Poland and many other countries displaying their educational products. Among those, we plan to consider 16 vendors who offered cloud solutions for this study. For example, Ed Solutions Ltd offered cloud based solution as 21st century schools on Google Apps for education suite platform as in Figure 4. Education processes identified in this study are marked. Vendor identified various functions for each process.

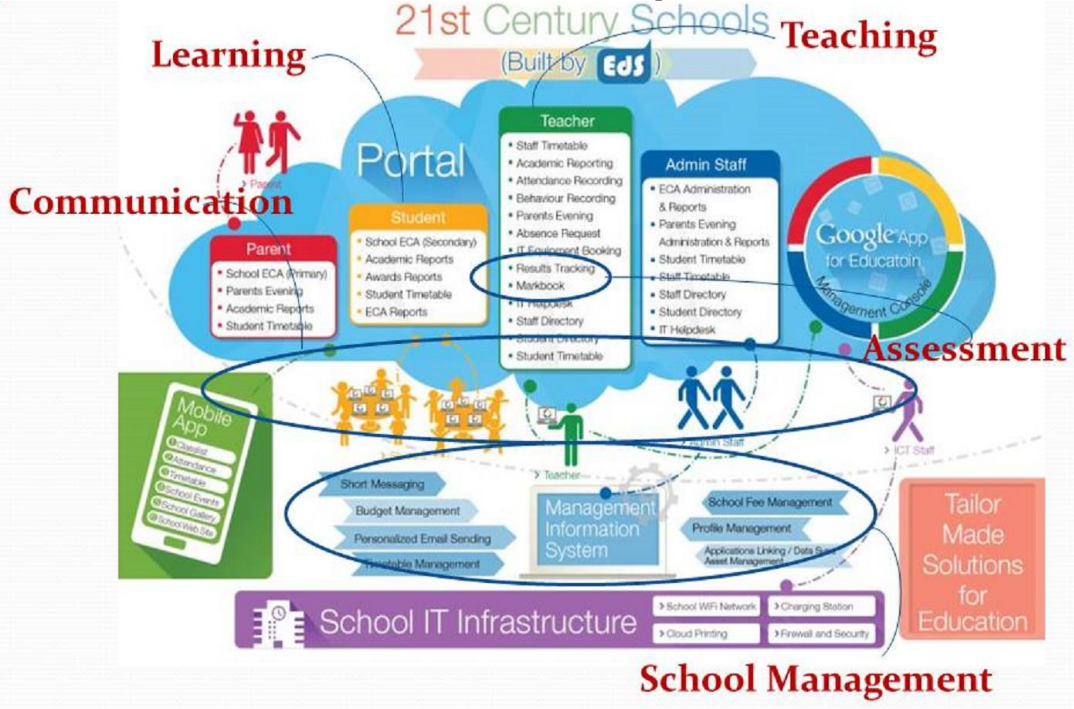


Figure 4. Cloud solution with processes marked

3.1 Repository of Education cloud IT services

All the salient features of various products pertaining to education processes are listed out in Table 2 from the research materials collected in line with cloud readiness proposed by Loebbecke (2012).

Video	Assignment Setter	Cafeteria
Audio	Feedback	Transport
Document creation(printed materials)	Exam paper setter	Government Correspondences
Content Creation	Marking Rubric	Video Conferencing
Resource Organizer	Marking	Intranet
Lesson Plan Organizer	Student Record	Internet (Messaging)
Homework & Assignment	Library	Activities Correspondences
Study Schedule	Finance	

Table 2 Repository of IT services for Education Cloud Readiness

Table 3 maps the relevant process items to the theories discussed earlier. The last five items of Table 2 such as government correspondences, video conferencing, intranet, internet (messaging) and activities correspondences are all communication processes that are used by the stakeholders which are to be considered for an education cloud. But they are not considered for the mapping as they are interlaced with every function of the various processes.

Various applications provided by the cloud vendors in the educational arena and the school usage on vendor offerings (to know the real value of the offered applications) has to be checked individually in some way which will be the future area of research. Available data are to be analysed in a robust way to prove the propositions thereby proposed model and the taxonomy that follows.

Process Items	**Theory of Social Support**		**Theory of Persuasiveness**		
	Appraisal Support	**Emotional Support**	**Customization**	**Self-monitoring**	**Surveillance**
Video			√		
Audio			√		
Document creation(printed materials)			√		
Content Creation			√		
Resource Organizer			√	√	
Lesson Plan Organizer			√	√	
Homework & Assignment	√		√		
Study Schedule	√		√		
Assignment Setter	√	√		√	√
Feedback	√	√		√	√
Exam paper setter	√	√		√	√
Marking Rubric	√		√		√
Marking	√	√	√	√	√
Student Record			√		
Library			√		
Finance			√		
Cafeteria			√		
Transport			√		

Table 3 Mapping of process items to the theory elements

4 TAXONOMY OF SOCIAL PERSUASIVE EDUCATION CLOUD

"Many teachers remain skeptical about computer use in the classroom, further hampering the adoption and integration of computers and new technologies" (Goodwin 2012). "There is an 'avoidance culture' amongst educators to adopt and integrate new technologies" (Pegg et al 2007). It appears that we need to bridge the gap between the learning in traditional way and using up-to-date technology. Although several infrastructures, platforms and applications are already in the cloud space, the concepts of social persuasive education cloud involved are not yet clearly explained in various areas of interest.

Taxonomies (Antonopoulos 2010) are a particular classification structure where concepts are arranged in a hierarchical way. The proposed education cloud taxonomy provides the clear picture of each process. The stakeholders can classify the environment and consider the features that meet their needs; schedule and organize their cloud adoption under various domains. In this study, Teaching, Learning, Assessment and School Management with underlying communication networks are considered as basic processes of any

education institution and presented pictorially in Figure 5. Data flows in all directions through the communication networks.

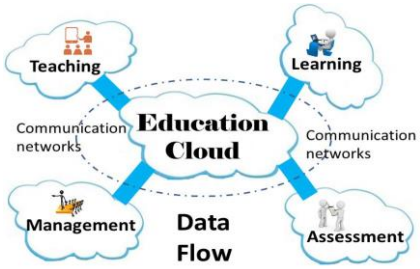


Figure 5. Education Cloud Framework

From the process items list of Table 3, we intuitively try to categorize the processes. Teaching process consists of video & audio, printed materials, content creation, lesson plan organizer and resources organizer (to list out resources used for teaching in class). Learning process consists of video, audio, homework & assignment, printed materials, study schedule are needed for student *learning*. Applications that help to set the assignments and exam papers, getting feedbacks, marking rubric and marking are considered for *assessment* process. Applications for student record maintenance, maintaining library, finance, cafeteria and transport constitutes the *school management* requirements.

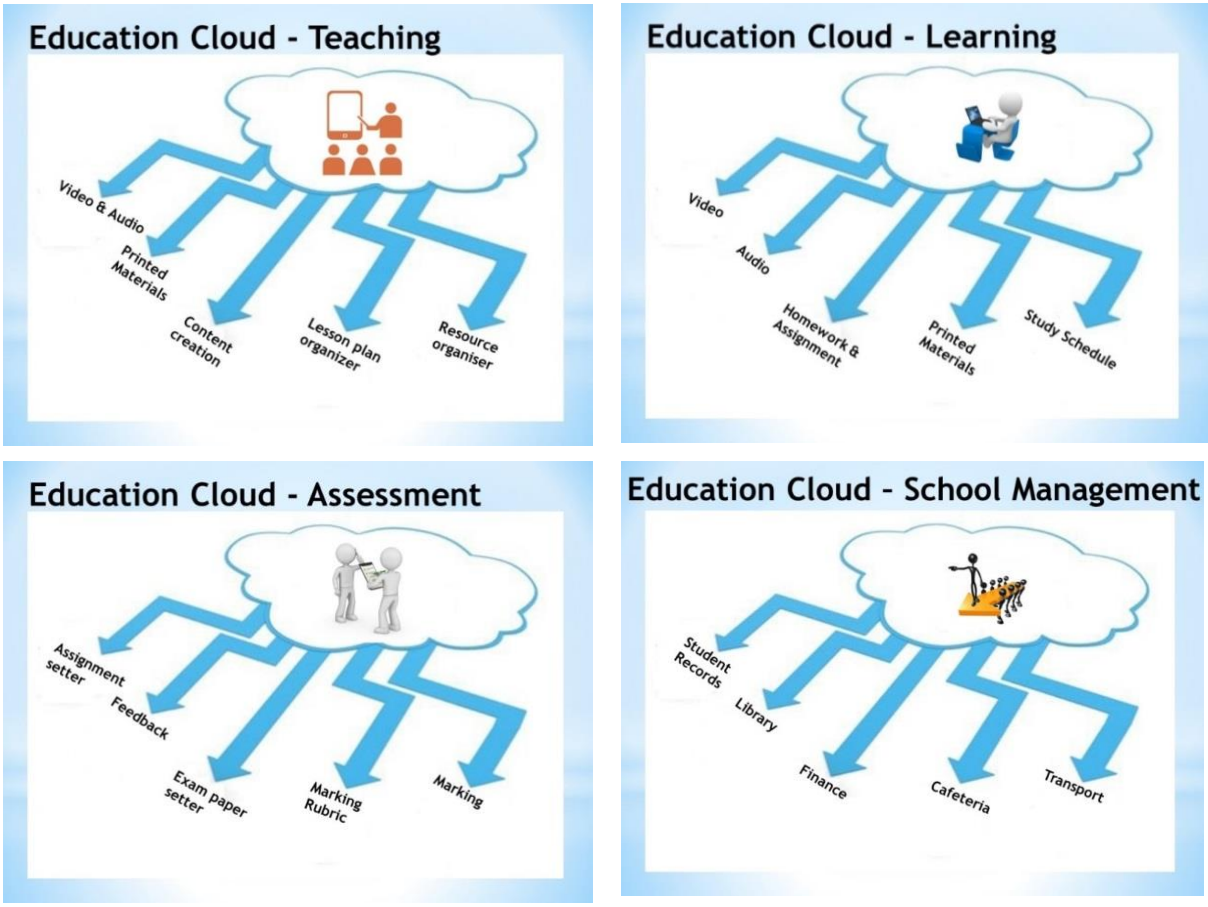


Figure 6. Education Cloud Processes

All the concerned teaching, learning, assessment and school management are pictorially represented in the Figure 6.

5 CONCLUSION

Studies on Social support in IS were mostly based on work stress (Weiss 1983) and health studies through online media (Yan & Tan 2014). This paper proposes a framework for IS researchers and educators considering social persuasive education cloud for improving various education processes (i.e. teaching, learning, assessment, school management) on which further research has to be done by analyzing the available data collected during the Learning and teaching expo and collecting data from vendors and schools on cloud implementations to analyze empirically.

In this decade, the cloud implementations in schools are increasing gradually with lot of providers in market offering solutions, some of them even for free like google education suite. So the stakeholder's knowledge on this area is inevitable to empower schools to adopt the cloud for more efficient practices. In this paper, we have proposed the taxonomy of the education processes in cloud environment which can help the stakeholders to work on planning and execution of setting up a cloud environment in schools and create value assessment model based on the services provided by the vendors.

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